

RESEARCH ARTICLE

Identification of a Novel Cassette Array in Integron-bearing *Helicobacter Pylori* Strains Isolated from Iranian Patients

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Abstract

Helicobacter pylori as the second most common cause of gastric cancer in the world infects approximately half of the developed countries population and 80% of the population living in developing countries. Integrins as genetic reservoirs play major roles in dissemination of antimicrobial resistance genes. To the best of our knowledge, this is the first study to report carriage of class 1 and 2 integrons and associated gene cassettes in *H. pylori* isolates from Iran. This cross-sectional study was conducted in Tehran among 110 patients with *H. pylori* infection. Antimicrobial susceptibility testing (AST) for *H. pylori* strains were assessed by the micro broth dilution method. Class 1 and 2 integrons were detected using PCR. In order to determine gene cassettes, amplified fragments were subjected to DNA sequencing of both amplicon strands. The prevalence of resistance to clarithromycin, metronidazole, clarithromycin, tetracycline, amoxicillin, rifampin, and levofloxacin were 68.2% (n=75), 25.5% (n=28), 24.5% (n=27), 19.1% (n=21), 18.2% (n=20) and 16.4% (n=18), respectively. Frequency of multidrug resistance among *H. pylori* isolates was 12.7%. Class 2 integron was detected in 50 (45.5%) and class 1 integron in 10 (9.1%) *H. pylori* isolates. The most predominant gene cassette arrays in class 2 integron-bearing *H. pylori* were included sat-era-aadA1, dfrA1-sat2-aadA1, bla_{oxa2} and, aadB whereas common gene cassette arrays in class 1 integron were aadB-aadA1-cmlA6, aacA4, bla_{oxa2}, and catB3. The high frequency of class 2 integron and multidrug resistance in the present study should be considered as a warning for clinicians that continuous surveillance is necessary to prevent the further spread of resistant isolates.

Keywords: *H. pylori* - integron s- multidrug-resistant strains - Iran

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Introduction

Helicobacter pylori (*H. pylori*) is a curved gram-negative, rod-shaped, flagellate, microaerophilic spiral bacillus and presently classified as a group I carcinogen by the World Health Organization International Agency for Research on Cancer (WHO/IARC). *H. pylori* plays an important role in chronic gastritis, peptic ulcers, gastric lymphoma and the development of adenocarcinoma (Malfertheiner et al., 2012). Gastric cancer is the second most common cancer in the world while long-standing infection with *H. pylori* significantly increases the risk of developing this disease.

H. pylori as one of the most common chronic bacterial infections worldwide is colonized in the stomachs of about 50-60% of the world's population. Bacterial infection has been spread over approximately 50% of the developed countries and 80% of the population living in developing

countries (Correa and Piazuelo, 2008). The prevalence of *H. pylori* infection varies globally in different populations and is associated with geographic area, socioeconomic factors, personal hygiene and age. *H. pylori* infection is generally acquired in childhood (Rafeey et al., 2007). Treatment of *H. pylori* infection is recommended in all symptomatic individuals, which is the main factor for eradication of *H. pylori* infection. Based on previous reports, *H. pylori* eradication leads to the reduction of the severity of gastric disease symptoms, the development of atrophic gastritis, the risk of cancer progression and complete recovery of patients (Smith et al., 2014).

Widespread antibiotics use for killing or eradication of enteric pathogens and respiratory tract infections led to the emergence of MDR to *H. pylori*. Failure of therapy not only leads to worsening of disease but also increases the resistance of the bacterium to the prescribed antibiotics (Rafeey et al., 2007; Smith et al., 2014).

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